

SEQUENCE LISTING

<110> Dickerson, Harry
Clark, Theodore G.
Lin, Tian-Long

<120> DIAGNOSTIC AND PROTECTIVE ANTIGEN GENE SEQUENCES OF
ICHTHYOPHTHIRIUS

<130> 235.00170101

<140> Unassigned

<141> 2000-02-04

<150> 60/131,121

<151> 1999-04-27

<150> 60/118,634

<151> 1999-02-04

<150> 60/122,372

<151> 1999-03-02

<150> 60/124,905

<151> 1999-03-17

<160> 102

<170> PatentIn Ver. 2.0

<210> 1

<211> 1326

<212> DNA

<213> Ichthyophthirius multifiliis

<400> 1

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cttggtactt gtgttaattg cagacctaat ttttactata atgggtggtgc tgcttaagga 180
gaagctaata gtaattaacc tttcgcagca aataatgctg ctagaggtat atgtgtacca 240
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taatgcagta cttaatgtcc tactggcact gcacttgatg atggagtgc agatgttttt 360
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gctgccgtta ctagttaatg tgtaccttgc caactaaaca aaaacgattc tctgcccact 540
gcaggtgcct aagctaattt agccacataa tgtagcaatt aatgtcctac tggcactgta 600
cttgatgatg gagtgcact tgtttttaat acatcagcca cattatgtgt taaatgcaga 660
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tcatccacat aatgtttctta atgcattgct aattactttt ttaatggtaa tttcgaagca 960
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<210> 2

<211> 2486

<212> DNA

<213> *Ichthyophthirius multifiliis*

<400> 2

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ttaaaaataat gaatcgatat tatataaatt tttatttttt ataaaatatt gaattaccta 240
aaataatata aatttatgaa atattattta aaataataag ttatagaata aattttatttt 300
tattttctaatt tttttttata attattaaaa aaaaaaaaaa aatctattac tattttgcat 360
ttacaaacga tagaaaaaac taaaatttat aatattatta aaaaaaaaaa tataaataat 420
aataataaaa atatgaaata taatatttta ttaattttta ttattttctt atttattaat 480
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gctgcttaag gagaagctaa tggttaattaa cttttcgag caaataatgc tgctagagggt 660
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attatcaatt aacaactaac taacaaaata caattaaaaat ctttatagaa ggtttttctt 1920
tataatattt taaggattaa tttacaaaatt ttaattaaaag taacatttta tcatttaaaa 1980
tcttattaaa ataaatacat aaattctagt tgattctttt ttaatattaa tttaaaatta 2040
gaataaaaaa atatgtttta agtaaaaaaa agaagaaatt taatttaatt tatttatatt 2100
taatttaata tttatttaatt ttatttttcga atattttattt atcaaacttt taaaactaaa 2160
aattttattaa gtctaattta aactatataat atttatattat tttgtattct tttttttatt 2220
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atcacttata tatgcgtatg taattttattg tatctcattc agggcttaag cttgtaaaat 2340
aataatattc aatatatttg ttaagggaaa ggttaggcaa actaaactaa attttttaac 2400
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<210> 3

<211> 1404

<212> DNA

<213> *Ichthyophthirius multifiliis*

<400> 3

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cctgcaaatt gtgttaattg ttagaaaaaac ttttattata ataatgctgc tgctttcgtt 180
cctggtgcta gtacgtgtac accttgtcca taaaaaaaag atgctggtgc ttaaccaaact 240
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attgcaggtg gagcaacaga ttatgcagca ataatcacag aatgtgttaa ttgtagaatt 360
aatttttata atgaaaatgc tccaaatttt aatgcaggtg ctagtacatg cacagcttgt 420
ccggtaaaca gagttggtgg tgcattgact gctggtaatg ccgctaccat agtcgcataa 480
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<210> 4

<211> 100

<212> DNA

<213> Ichthyophthirius multifiliis

<400> 4

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<210> 5

<211> 1404

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic
55kD i-antigen coding region

<400> 5

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cctgctaact gtgtgaactg tcagaagaac ttctactaca acaacgctgc tgctttcgtg 180
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tgtaacgtgg cttgtcctac cggaaccgct ctggacgacg gactgaccac cgactacgtg 540
cgctctttca ccgagtgtgt gaagtgtcgc ctgaacttct actacaacgg aaacaacgga 600
aacaccctt tcaaccctgg aaagtctcag tgtaccctt gtccctgctat caagcctgct 660
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<210> 6

<211> 442

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 6

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004020: 09626460

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Leu Thr Asp Val Gly Ala Ala Asp Leu Gly Thr Cys Val Asn Cys Arg	35	40	45
Pro Asn Phe Tyr Tyr Asn Gly Gly Ala Ala Gln Gly Glu Ala Asn Gly	50	55	60
Asn Gln Pro Phe Ala Ala Asn Asn Ala Ala Arg Gly Ile Cys Val Pro	65	70	75
Cys Gln Ile Asn Arg Val Gly Ser Val Thr Asn Ala Gly Asp Leu Ala	85	90	95
Thr Leu Ala Thr Gln Cys Ser Thr Gln Cys Pro Thr Gly Thr Ala Leu	100	105	110
Asp Asp Gly Val Thr Asp Val Phe Asp Arg Ser Ala Ala Gln Cys Val	115	120	125
Lys Cys Lys Pro Asn Phe Tyr Tyr Asn Gly Gly Ser Pro Gln Gly Glu	130	135	140
Ala Pro Gly Val Gln Val Phe Ala Ala Gly Ala Ala Ala Ala Gly Val	145	150	155
Ala Ala Val Thr Ser Gln Cys Val Pro Cys Gln Leu Asn Lys Asn Asp	165	170	175
Ser Pro Ala Thr Ala Gly Ala Gln Ala Asn Leu Ala Thr Gln Cys Ser	180	185	190
Asn Gln Cys Pro Thr Gly Thr Val Leu Asp Asp Gly Val Thr Leu Val	195	200	205
Phe Asn Thr Ser Ala Thr Leu Cys Val Lys Cys Arg Pro Asn Phe Tyr	210	215	220
Tyr Asn Gly Gly Ser Pro Gln Gly Glu Ala Pro Gly Val Gln Val Phe	225	230	235
Ala Ala Gly Ala Ala Ala Ala Gly Val Ala Ala Val Thr Ser Gln Cys	245	250	255
Val Pro Cys Gln Ile Asn Lys Asn Asp Ser Pro Ala Thr Ala Gly Ala			

260	265	270
Gln Ala Asn Leu Ala Thr Gln Cys Ser Thr Gln Cys Pro Thr Gly Thr		
275	280	285
Ala Ile Gln Asp Gly Val Thr Leu Val Phe Ser Asn Ser Ser Thr Gln		
290	295	300
Cys Ser Gln Cys Ile Ala Asn Tyr Phe Phe Asn Gly Asn Phe Glu Ala		
305	310	315
Gly Lys Ser Gln Cys Leu Lys Cys Pro Val Ser Lys Thr Thr Pro Ala		
325	330	335
His Ala Pro Gly Asn Thr Ala Thr Gln Ala Thr Gln Cys Leu Thr Thr		
340	345	350
Cys Pro Ala Gly Thr Val Leu Asp Asp Gly Thr Ser Thr Asn Phe Val		
355	360	365
Ala Ser Ala Thr Glu Cys Thr Lys Cys Ser Ala Gly Phe Phe Ala Ser		
370	375	380
Lys Thr Thr Gly Phe Thr Ala Gly Thr Asp Thr Cys Thr Glu Cys Thr		
385	390	395
Lys Lys Leu Thr Ser Gly Ala Thr Ala Lys Val Tyr Ala Glu Ala Thr		
405	410	415
Gln Lys Val Gln Cys Ala Ser Thr Thr Phe Ala Lys Phe Leu Ser Ile		
420	425	430
Ser Leu Leu Phe Ile Ser Phe Tyr Leu Leu		
435	440	

<210> 7

<211> 468

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 7

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Gly Gln Val Asp Asp Leu Gly Thr Pro Ala Asn Cys Val Asn Cys Gln
 35 40 45
 Lys Asn Phe Tyr Tyr Asn Asn Ala Ala Ala Phe Val Pro Gly Ala Ser
 50 55 60
 Thr Cys Thr Pro Cys Pro Gln Lys Lys Asp Ala Gly Ala Gln Pro Asn
 65 70 75 80
 Pro Pro Ala Thr Ala Asn Leu Val Thr Gln Cys Asn Val Lys Cys Pro
 85 90 95
 Ala Gly Thr Ala Ile Ala Gly Gly Ala Thr Asp Tyr Ala Ala Ile Ile
 100 105 110
 Thr Glu Cys Val Asn Cys Arg Ile Asn Phe Tyr Asn Glu Asn Ala Pro
 115 120 125
 Asn Phe Asn Ala Gly Ala Ser Thr Cys Thr Ala Cys Pro Val Asn Arg
 130 135 140
 Val Gly Gly Ala Leu Thr Ala Gly Asn Ala Thr Ile Val Ala Gln
 145 150 155 160
 Cys Asn Val Ala Cys Pro Thr Gly Thr Ala Leu Asp Asp Gly Val Thr
 165 170 175
 Thr Asp Tyr Val Arg Ser Phe Thr Glu Cys Val Lys Cys Arg Leu Asn
 180 185 190
 Phe Tyr Tyr Asn Gly Asn Asn Gly Asn Thr Pro Phe Asn Pro Gly Lys
 195 200 205
 Ser Gln Cys Thr Pro Cys Pro Ala Ile Lys Pro Ala Asn Val Ala Gln
 210 215 220
 Ala Thr Leu Gly Asn Asp Ala Thr Ile Thr Ala Gln Cys Asn Val Ala
 225 230 235 240
 Cys Pro Asp Gly Thr Ile Ser Ala Ala Gly Val Asn Asn Trp Val Ala
 245 250 255
 Gln Asn Thr Glu Cys Thr Asn Cys Ala Pro Asn Phe Tyr Asn Asn Asn
 260 265 270
 Ala Pro Asn Phe Asn Pro Gly Asn Ser Thr Cys Leu Pro Cys Pro Ala
 275 280 285

Asn Lys Asp Tyr Gly Ala Glu Ala Thr Ala Gly Gly Ala Ala Thr Leu
290 295 300

Ala Lys Gln Cys Asn Ile Ala Cys Pro Asp Gly Thr Ala Ile Ala Ser
305 310 315 320

Gly Ala Thr Asn Tyr Val Ile Leu Gln Thr Glu Cys Leu Asn Cys Ala
325 330 335

Ala Asn Phe Tyr Phe Asp Gly Asn Asn Phe Gln Ala Gly Ser Ser Arg
340 345 350

Cys Lys Ala Cys Pro Ala Asn Lys Val Gln Gly Ala Val Ala Thr Ala
355 360 365

Gly Gly Thr Ala Thr Leu Ile Ala Gln Cys Ala Leu Glu Cys Pro Ala
370 375 380

Gly Thr Val Leu Thr Asp Gly Thr Thr Ser Thr Tyr Lys Gln Ala Ala
385 390 395 400

Ser Glu Cys Val Lys Cys Ala Ala Asn Phe Tyr Thr Thr Lys Gln Thr
405 410 415

Asp Trp Val Ala Gly Ile Asp Thr Cys Thr Ser Cys Asn Lys Lys Leu
420 425 430

Thr Ser Gly Ala Glu Ala Asn Leu Pro Glu Ser Ala Lys Lys Asn Ile
435 440 445

Gln Cys Asp Phe Ala Asn Phe Leu Ser Ile Ser Leu Leu Leu Ile Ser
450 455 460

Tyr Tyr Leu Leu
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<210> 8

<211> 83

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 8

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1 5 10 15

Ala Asp Leu Gly Thr Cys Val Asn Cys Arg Pro Asn Phe Tyr Tyr Asn
20 25 30

Gly Gly Ala Ala Gln Gly Glu Ala Asn Gly Asn Gln Pro Phe Ala Ala
 35 40 45

Asn Asn Ala Ala Arg Gly Ile Cys Val Pro Cys Gln Ile Asn Arg Val
 50 55 60

Gly Ser Val Thr Asn Ala Gly Asp Leu Ala Thr Leu Ala Thr Gln Cys
 65 70 75 80

Ser Thr Gln

<210> 9
 <211> 89
 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 9
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 1 5 10 15

Arg Ser Ala Ala Gln Cys Val Lys Cys Lys Pro Asn Phe Tyr Tyr Asn
 20 25 30

Gly Gly Ser Pro Gln Gly Glu Ala Pro Gly Val Gln Val Phe Ala Ala
 35 40 45

Gly Ala Ala Ala Ala Gly Val Ala Ala Val Thr Ser Gln Cys Val Pro
 50 55 60

Cys Gln Leu Asn Lys Asn Asp Ser Pro Ala Thr Ala Gly Ala Gln Ala
 65 70 75 80

Asn Leu Ala Thr Gln Cys Ser Asn Gln
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<210> 10
 <211> 89
 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 10
 Cys Pro Thr Gly Thr Val Leu Asp Asp Gly Val Thr Leu Val Phe Asn
 1 5 10 15

Thr Ser Ala Thr Leu Cys Val Lys Cys Arg Pro Asn Phe Tyr Tyr Asn
 20 25 30
 Gly Gly Ser Pro Gln Gly Glu Ala Pro Gly Val Gln Val Phe Ala Ala
 35 40 45
 Gly Ala Ala Ala Ala Gly Val Ala Ala Val Thr Ser Gln Cys Val Pro
 50 55 60
 Cys Gln Ile Asn Lys Asn Asp Ser Pro Ala Thr Ala Gly Ala Gln Ala
 65 70 75 80
 Asn Leu Ala Thr Gln Cys Ser Thr Gln
 85

<210> 11
 <211> 69
 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 11
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 1 5 10 15
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 20 25 30
 Gly Asn Phe Glu Ala Gly Lys Ser Gln Cys Leu Lys Cys Pro Val Ser
 35 40 45
 Lys Thr Thr Pro Ala His Ala Pro Gly Asn Thr Ala Thr Gln Ala Thr
 50 55 60
 Gln Cys Leu Thr Thr
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<210> 12
 <211> 72
 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 12
 Cys Pro Ala Gly Thr Val Leu Asp Asp Gly Thr Ser Thr Asn Phe Val
 1 5 10 15
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20 25 30
 Lys Thr Thr Gly Phe Thr Ala Gly Thr Asp Thr Cys Thr Glu Cys Thr
 35 40 45
 Lys Lys Leu Thr Ser Gly Ala Thr Ala Lys Val Tyr Ala Glu Ala Thr
 50 55 60
 Gln Lys Val Gln Cys Ala Ser Thr
 65 70

<210> 13
 <211> 14
 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 13
 Phe Leu Ser Ile Ser Leu Leu Phe Ile Ser Phe Tyr Leu Leu
 1 5 10

<210> 14
 <211> 23
 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 14
 Gln Cys Ala Ser Thr Thr Phe Ala Lys Phe Leu Ser Ile Ser Leu Leu
 1 5 10 15

Phe Ile Ser Phe Tyr Leu Leu
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<210> 15
 <211> 20
 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 15
 Met Lys Asn Asn Ile Leu Val Ile Leu Ile Ile Ser Leu Phe Ile Asn
 1 5 10 15

Gln Ile Lys Ser
 20

<210> 16
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 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 16
 Phe Leu Ser Ile Ser Leu Leu Leu Ile Ser Tyr Tyr Leu Leu
 1 5 10

<210> 17
 <211> 20
 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 17
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 1 5 10 15

Tyr Tyr Leu Leu
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<210> 18
 <211> 33
 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 18
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 1 5 10 15

Phe Ala Lys Phe Leu Ser Ile Ser Leu Leu Phe Ile Ser Phe Tyr Leu
 20 25 30

Leu

<210> 19
 <211> 60
 <212> DNA
 <213> Ichthyophthirius multifiliis

<400> 19
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<210> 20

<211> 60
 <212> DNA
 <213> *Ichthyophthirius multifiliis*

 <400> 20
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 <210> 21
 <211> 24
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: antisense
 primer

 <400> 21
 agcagcacct acatcagtc aatcc 24

 <210> 22
 <211> 17
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: universal
 primer

 <400> 22
 gtaaaacgac ggccagt 17

 <210> 23
 <211> 40
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: EPBdT18
 primer

 <400> 23
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 <210> 24
 <211> 26
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: forward
primer

<400> 24

gtgtcgacag caggtactga tacatg

26

<210> 25

<211> 24

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: forward
primer

<400> 25

cgaaaacagt ggtggtagta cctt

24

<210> 26

<211> 22

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: reverse
primer

<400> 26

gcgaattctg caggatccaa ac

22

<210> 27

<211> 24

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:
oligonucleotide probe

<400> 27

agcagcacca acatcagtca aacc

24

<210> 28

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: forward
primer

<400> 28

atggaatta acctttcgca gcaaataa

28

<210> 29

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: reverse
primer

<400> 29

ggtctgcatt taacacataa

20

<210> 30

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: reverse
primer

<400> 30

agatacatca gtatacgaaa

20

<210> 31

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: primary
structure motif

<400> 31

Cys Xaa Xaa Cys

1

<210> 32

<211> 5

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: primary
structure motif

<400> 32

Cys Xaa Xaa Xaa Cys
1 5

<210> 33

<211> 53

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: repeating
primary structure motif

<400> 33

Cys Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
1 5 10 15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa Xaa Cys Xaa Xaa Xaa
20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Cys Xaa Xaa Cys
50

<210> 34

<211> 8

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: i-antigen
P-loop domain

<400> 34

Gly Xaa Xaa Xaa Xaa Gly Lys Ser
1 5

<210> 35
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: sense primer

<400> 35
 atgaaataya ayattttatt aatt 24

<210> 36
 <211> 8
 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 36
 Met Lys Tyr Asn Ile Leu Leu Thr
 1 5

<210> 37
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: antisense
 primer

<400> 37
 aaataataar gaaatmgata aaaa 24

<210> 38
 <211> 8
 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 38
 Phe Leu Ser Ile Ser Leu Leu Phe
 1 5

<210> 39
 <211> 26
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: antisense
primer

<400> 39

tgctcgagaa tctgttgctc cacctg

26

<210> 40

<211> 52

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: forward
primer

<400> 40

ccagtgcgca gaggacgag gactcgagct caagcccccc cccccccccc cc

52

<210> 41

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: forward
primer

<400> 41

gaggactcga gctcaagc

18

<210> 42

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: reverse
primer

<400> 42

aactcgagta ccagcagggc atttaac

27

<210> 43

<211> 23

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: primer

<400> 43

cacaccttgt ccggcaatta aac

23

<210> 44

<211> 1410

<212> DNA

<213> Ichthyophthirius multifiliis

<400> 44

atgaaaaata atatttttagt aatattgatt atttcattat ttatcaatta aattaaatct 60
gctaattgtc ctggttgaac tgaaactaac acagccgat aagttgatga tctaggaact 120
cctgcaaatt gtgttaattg ttagaaaaaac ttttattata ataatgctgc tgctttcgtt 180
cctggtgcta gtacgtgtac acctgtcca taaaaaaaag atgctggtgc ttaaccaaact 240
ccacctgcta ctgctaattt agtcacataa tgtaacgtta aatgccctgc tggtagcgca 300
attgcagggtg gagcaacaga ttatgcagca ataatcacag aatgtgttaa ttgtagaatt 360
aatttttata atgaaaatgc tccaaatttt aatgcagggtg ctagtacatg cacagcttgt 420
ccggtaaaaca gagttggtgg tgcattgact gctggtaatg ccgctaccat agtcgcataa 480
tgtaacgtcg catgtcctac tggtagtgca cttgatgatg gagtaactac tgattatgtt 540
agatcattca cagaatgtgt taaatgtaga ctttaactttt actataatgg taataatgg 600
aatactcctt tcaatccagg taaaagttaa tgcacacctt gtccggcaat taaacctgct 660
aatgttgctt aagctacttt aggtaatgat gctacaataa ccgcataatg taacgttgca 720
tgccctgatg gtactataag tgctgctgga gtaataaatt gggtagcaca aaacactgaa 780
tgtactaatt gtgctcctaa cttttacaat aataatgctc ctaatttcaa tccaggtaat 840
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cctgaatctg ctaaaaaaaaa tatataatgt gatttcgcta attttttatc aatttcctta 1380
ttattgattt cttattattt attatgatga 1410

<210> 45

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: forward
primer

<400> 45

ccgaattctc tgggactgca cttgatgatg gag

33

<210> 46
<211> 8
<212> PRT
<213> Ichthyophthirius multifiliis

<400> 46
Gly Thr Ala Leu Asp Asp Gly Val
1 5

<210> 47
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: reverse
primer

<400> 47
gtggatccag tacatgttac artacctgc

29

<210> 48
<211> 7
<212> PRT
<213> Ichthyophthirius multifiliis

<400> 48
Ala Gly Thr Asp Thr Cys Thr
1 5

<210> 49
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: reverse
primer

<400> 49
gtggatccrc cagaagttaa ttttttakta c

31

<210> 50
<211> 9
<212> PRT

<213> Ichthyophthirius multifiliis

<400> 50

Cys Thr Lys Lys Leu Thr Ser Gly Ala
1 5

<210> 51

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: reverse
primer

<400> 51

gtggatccaa ggaaatygat aaaaawttag cg

32

<210> 52

<211> 9

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 52

Phe Ala Lys Phe Leu Ser Ile Ser Leu
1 5

<210> 53

<211> 1404

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic G5
proline mutant i-antigen

<400> 53

atgaagaaca acatcccggg gatcctgac atctctctgt tcatcaacca gatcaagtct 60
gctaactgtc ctgtgggaac cgagaccaac accgctggac aggtggacga cctgggaacc 120
cctgctaact gtgtgaactg tcagaagaac ttctactaca acaacgctgc tgctttcgtg 180
cctggagctt ctacctgtac cccttgctcct cagaagaagg acgctggagc tcagcctaac 240
cctcctgcta ccgctaacct ggtgacccag tgtaacgtga agtgtcctgc tggaaccgct 300
atcgctggag gagctaccga ctacgctgct atcatcaccg agtgtgtgaa ctgtcgcac 360
aacttctaca acgagaacgc tcctaacttc aacgctggag cttctacctg taccgcttgt 420
cctgtgaacc gtgtgggagg agctctgacc gctggaaacg ctgctaccat cgtggctcag 480
tgtaacgtgg cttgtcctac cggaaccgct ctggacgacg gagtgaccac cgactacgtg 540

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cgctctttca ccgagtgtgt gaagtgtcgc ctgaacttct actacaacgg aaacaacgga 600
aacacccctt tcaaccctgg aaagtctcag tgtaccctt gtctgtctat caagcctgct 660
aacgtggctc aggtaccctt gggaaacgac gctaccatca ccgtcagtg taacgtggct 720
tgtcttgacg gaaccatctc tgctgtctga gtgaacaact ggttggtca gaacaccgag 780
tgtaccaact gtgctcctaa cttctacaac aacaacgctc ctaacttcaa ccctggaaac 840
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gctgtacctc tggctaagca gtgtaacatc gcttgtcctg acggaaccgc tatcgcttct 960
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tctgagtgtg tgaagtgtgc tgctaacttc tacaccacca agcagaccga ctgggtggct 1260
ggaatcgaca cctgtacctc ttgtaacaag aagctgacct ctggagctga ggctaacctg 1320
cctgagtctg ctaagaagaa catccagtg gacttcgcta acttcctgtc tatctctctg 1380
ctgctgatct cttactacct gctg                                     1404

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<210> 54

<211> 468

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic G5
proline mutant antigen protein

<400> 54

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Met Lys Asn Asn Ile Pro Val Ile Leu Ile Ile Ser Leu Phe Ile Asn
  1               5               10               15

```

```

Gln Ile Lys Ser Ala Asn Cys Pro Val Gly Thr Glu Thr Asn Thr Ala
      20               25               30

```

```

Gly Gln Val Asp Asp Leu Gly Thr Pro Ala Asn Cys Val Asn Cys Gln
      35               40               45

```

```

Lys Asn Phe Tyr Tyr Asn Asn Ala Ala Ala Phe Val Pro Gly Ala Ser
      50               55               60

```

```

Thr Cys Thr Pro Cys Pro Gln Lys Lys Asp Ala Gly Ala Gln Pro Asn
      65               70               75               80

```

```

Pro Pro Ala Thr Ala Asn Leu Val Thr Gln Cys Asn Val Lys Cys Pro
      85               90               95

```

```

Ala Gly Thr Ala Ile Ala Gly Gly Ala Thr Asp Tyr Ala Ala Ile Ile
      100               105               110

```

```

Thr Glu Cys Val Asn Cys Arg Ile Asn Phe Tyr Asn Glu Asn Ala Pro

```

115	120	125
Asn Phe Asn Ala Gly Ala Ser Thr Cys Thr Ala Cys Pro Val Asn Arg		
130	135	140
Val Gly Gly Ala Leu Thr Ala Gly Asn Ala Ala Thr Ile Val Ala Gln		
145	150	155
Cys Asn Val Ala Cys Pro Thr Gly Thr Ala Leu Asp Asp Gly Val Thr		
165	170	175
Thr Asp Tyr Val Arg Ser Phe Thr Glu Cys Val Lys Cys Arg Leu Asn		
180	185	190
Phe Tyr Tyr Asn Gly Asn Asn Gly Asn Thr Pro Phe Asn Pro Gly Lys		
195	200	205
Ser Gln Cys Thr Pro Cys Pro Ala Ile Lys Pro Ala Asn Val Ala Gln		
210	215	220
Ala Thr Leu Gly Asn Asp Ala Thr Ile Thr Ala Gln Cys Asn Val Ala		
225	230	235
Cys Pro Asp Gly Thr Ile Ser Ala Ala Gly Val Asn Asn Trp Val Ala		
245	250	255
Gln Asn Thr Glu Cys Thr Asn Cys Ala Pro Asn Phe Tyr Asn Asn Asn		
260	265	270
Ala Pro Asn Phe Asn Pro Gly Asn Ser Thr Cys Leu Pro Cys Pro Ala		
275	280	285
Asn Lys Asp Tyr Gly Ala Glu Ala Thr Ala Gly Gly Ala Ala Thr Leu		
290	295	300
Ala Lys Gln Cys Asn Ile Ala Cys Pro Asp Gly Thr Ala Ile Ala Ser		
305	310	315
Gly Ala Thr Asn Tyr Val Ile Leu Gln Thr Glu Cys Leu Asn Cys Ala		
325	330	335
Ala Asn Phe Tyr Phe Asp Gly Asn Asn Phe Gln Ala Gly Ser Ser Arg		
340	345	350
Cys Lys Ala Cys Pro Ala Asn Lys Val Gln Gly Ala Val Ala Thr Ala		
355	360	365
Gly Gly Thr Ala Thr Leu Ile Ala Gln Cys Ala Leu Glu Cys Pro Ala		

370 375 380
 Gly Thr Val Leu Thr Asp Gly Thr Thr Ser Thr Tyr Lys Gln Ala Ala
 385 390 395 400
 Ser Glu Cys Val Lys Cys Ala Ala Asn Phe Tyr Thr Thr Lys Gln Thr
 405 410 415
 Asp Trp Val Ala Gly Ile Asp Thr Cys Thr Ser Cys Asn Lys Lys Leu
 420 425 430
 Thr Ser Gly Ala Glu Ala Asn Leu Pro Glu Ser Ala Lys Lys Asn Ile
 435 440 445
 Gln Cys Asp Phe Ala Asn Phe Leu Ser Ile Ser Leu Leu Leu Ile Ser
 450 455 460
 Tyr Tyr Leu Leu
 465
 <210> 55
 <211> 72
 <212> PRT
 <213> Ichthyophthirius multifiliis
 <400> 55
 Cys Pro Val Gly Thr Glu Thr Asn Thr Ala Gly Gln Val Asp Asp Leu
 1 5 10 15
 Gly Thr Pro Ala Asn Cys Val Asn Cys Gln Lys Asn Phe Tyr Tyr Asn
 20 25 30
 Asn Ala Ala Ala Phe Val Pro Gly Ala Ser Thr Cys Thr Pro Cys Pro
 35 40 45
 Gln Lys Lys Asp Ala Gly Ala Gln Pro Asn Pro Pro Ala Thr Ala Asn
 50 55 60
 Leu Val Thr Gln Cys Asn Val Lys
 65 70

<210> 56
 <211> 70
 <212> PRT
 <213> Ichthyophthirius multifiliis

<400> 56

Cys Pro Ala Gly Thr Ala Ile Ala Gly Gly Ala Thr Asp Tyr Ala Ala
1 5 10 15

Ile Ile Thr Glu Cys Val Asn Cys Arg Ile Asn Phe Tyr Asn Glu Asn
20 25 30

Ala Pro Asn Phe Asn Ala Gly Ala Ser Thr Cys Thr Ala Cys Pro Val
35 40 45

Asn Arg Val Gly Gly Ala Leu Thr Ala Gly Asn Ala Ala Thr Ile Val
50 55 60

Ala Gln Cys Asn Val Ala
65 70

<210> 57

<211> 76

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 57

Cys Pro Thr Gly Thr Ala Leu Asp Asp Gly Val Thr Thr Asp Tyr Val
1 5 10 15

Arg Ser Phe Thr Glu Cys Val Lys Cys Arg Leu Asn Phe Tyr Tyr Asn
20 25 30

Gly Asn Asn Gly Asn Thr Pro Phe Asn Pro Gly Lys Ser Gln Cys Thr
35 40 45

Pro Cys Pro Ala Ile Lys Pro Ala Asn Val Ala Gln Ala Thr Leu Gly
50 55 60

Asn Asp Ala Thr Ile Thr Ala Gln Cys Asn Val Ala
65 70 75

<210> 58

<211> 71

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 58

Cys Pro Asp Gly Thr Ile Ser Ala Ala Gly Val Asn Asn Trp Val Ala
1 5 10 15

Gln Asn Thr Glu Cys Thr Asn Cys Ala Pro Asn Phe Tyr Asn Asn Asn
 20 25 30

Ala Pro Asn Phe Asn Pro Gly Asn Ser Thr Cys Leu Pro Cys Pro Ala
 35 40 45

Asn Lys Asp Tyr Gly Ala Glu Ala Thr Ala Gly Gly Ala Ala Thr Leu
 50 55 60

Ala Lys Gln Cys Asn Ile Ala
 65 70

<210> 59

<211> 70

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 59

Cys Pro Asp Gly Thr Ala Ile Ala Ser Gly Ala Thr Asn Tyr Val Ile
 1 5 10 15

Leu Gln Thr Glu Cys Leu Asn Cys Ala Ala Asn Phe Tyr Phe Asp Gly
 20 25 30

Asn Asn Phe Gln Ala Gly Ser Ser Arg Cys Lys Ala Cys Pro Ala Asn
 35 40 45

Lys Val Gln Gly Ala Val Ala Thr Ala Gly Gly Thr Ala Thr Leu Ile
 50 55 60

Ala Gln Cys Ala Leu Glu
 65 70

<210> 60

<211> 72

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 60

Cys Pro Ala Gly Thr Val Leu Thr Asp Gly Thr Thr Ser Thr Tyr Lys
 1 5 10 15

Gln Ala Ala Ser Glu Cys Val Lys Cys Ala Ala Asn Phe Tyr Thr Thr
 20 25 30

Lys Gln Thr Asp Trp Val Ala Gly Ile Asp Thr Cys Thr Ser Cys Asn

Pro Thr Gly Thr Val Leu Asp Asp Gly Val Thr Leu Val Phe Asn Thr
180 185 190

Ser Ala Thr Leu Cys Val Lys Cys Arg Pro Asn Phe Tyr Tyr Asn Gly
195 200 205

Gly Ser Pro Gln Gly Glu Ala Pro Gly Val Gln Val Phe Ala Ala Gly
210 215 220

Ala Ala Ala Ala Gly Val Ala Ala Val Thr Ser Gln Cys Val Pro Cys
225 230 235 240

Gln Ile Asn Lys Asn Asp Ser Pro Ala Thr Ala Gly Ala Gln Ala Asn
245 250 255

Leu Ala Thr Gln Cys Ser Thr Gln Cys Pro Thr Gly Thr Ala Ile Gln
260 265 270

Asp Gly Val Thr Leu Val Phe Ser Asn Ser Ser Thr Gln Cys Ser Gln
275 280 285

Cys Ile Ala Asn Tyr Phe Phe Asn Gly Asn Phe Glu Ala Gly Lys Ser
290 295 300

Gln Cys Leu Lys Cys Pro Val Ser Lys Thr Thr Pro Ala His Ala Pro
305 310 315 320

Gly Asn Thr Ala Thr Gln Ala Thr Gln Cys Leu Thr Thr Cys Pro Ala
325 330 335

Gly Thr Val Leu Asp Asp Gly Thr Ser Thr Asn Phe Val Ala Ser Ala
340 345 350

Thr Glu Cys Thr Lys Cys Ser Ala Gly Phe Phe Ala Ser Lys Thr Thr
355 360 365

Gly Phe Thr Ala Gly Thr Asp Thr Cys Thr Glu Cys Thr Lys Lys Leu
370 375 380

Thr Ser Gly Ala Thr Ala Lys Val Tyr Ala Glu Ala Thr Gln Lys Val
385 390 395 400

Gln Cys Ala Ser Thr Thr Phe Ala Lys
405

<210> 62

<211> 399

<212> PRT

<213> Giardia lamblia virus

<400> 62

Ala Val Asp Cys Gln Gly Ser Ala Gly Tyr Tyr Thr Asp Asp Ser Val
1 5 10 15

Ser Asp Ala Lys Glu Cys Lys Lys Cys Asn Ala Pro Cys Thr Ala Cys
20 25 30

Ala Gly Thr Ala Asp Lys Cys Thr Lys Cys Asp Ala Asn Gly Ala Ala
35 40 45

Pro Tyr Leu Lys Lys Thr Asn Pro Ser Asp Pro Thr Gly Thr Cys Val
50 55 60

Ser Ala Val Asp Cys Gln Gly Ser Ala Gly Tyr Tyr Thr Asp Asp Ser
65 70 75 80

Val Ser Asp Ala Lys Glu Cys Lys Lys Cys Ala Glu Gly Gln Lys Pro
85 90 95

Asn Thr Ala Gly Thr Gln Cys Phe Ser Cys Ser Asp Ala Asn Cys Glu
100 105 110

Arg Cys Asp Gln Asn Asp Val Cys Ala Arg Cys Ser Thr Gly Ala Pro
115 120 125

Pro Glu Asn Gly Lys Cys Pro Ala Ala Thr Pro Gly Cys His Ser Ser
130 135 140

Cys Asp Gly Cys Thr Glu Asn Ala Met Thr Asn Gln Ala Asp Lys Cys
145 150 155 160

Thr Gly Cys Lys Glu Gly Arg Tyr Leu Lys Pro Glu Ser Ala Ala Gly
165 170 175

Gln Ser Gly Thr Cys Leu Thr Ala Glu Glu Cys Thr Ser Asp Thr Thr
180 185 190

His Phe Thr Lys Glu Lys Ala Gly Asp Ser Lys Gly Met Cys Leu Pro
195 200 205

Cys Ser Asp Ala Thr His Gly Ile Ala Gly Cys Lys Lys Cys Ala Leu
210 215 220

Lys Thr Leu Ser Gly Glu Ala Glu Ser Thr Val Val Cys Ser Glu Cys
225 230 235 240

gtaaatatcc attaatgaag cttcgaaaac agtggtgga gtaccttatt catgcttgaa 60
gtatttagaa tcaagag 77

<210> 65

<211> 33

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 65

Lys Val Tyr Ala Glu Ala Thr Gln Lys Val Gln Cys Ala Ser Thr Thr
1 5 10 15

Phe Ala Lys Phe Leu Ser Ile Ser Leu Leu Phe Ile Ser Phe Tyr Leu
20 25 30

Leu

<210> 66

<211> 202

<212> DNA

<213> Ichthyophthirius multifiliis

<400> 66

aaagtatatg ctgaagctac tcaaaaagta taatgcgcct ccactacttt cgctaaattt 60
ttatcgattt ccttattatt tatttctttc tatttattgt gatgaataaa ataattcata 120
ttattttatt tttttatttt atgtttataa attaaaaaat agataaaatt taaaatatat 180
taaaaataat tttttatata aa 202

<210> 67

<211> 199

<212> DNA

<213> Ichthyophthirius multifiliis

<400> 67

aaagtatatg ctgaagctac tcaaaaagta taatgcgcct ccactacttt cgctaaattt 60
ttatcgattt ccttattatt tatttctttc tatttattgt gattaataaa ataattcata 120
ttattttatt tttttatttt atgtttataa attaaaaaat agataaaatt taaaatatat 180
taaaaaaaaa aaaaaaaaaa 199

<210> 68

<211> 162

<212> DNA

<213> Ichthyophthirius multifiliis

<400> 68

aaagtatatg ctgaagctac tcaaaaagta taatgcgcct ccactacttt cgctaaattt 60

ttatcgattt ccttattatt tatttctttc tatttattgt gatgaataaa ataattcata 120
 ttattttatt tttttatttt atgtttataa attaaaaaat ag 162

<210> 69

<211> 119

<212> DNA

<213> Ichthyophthirius multifiliis

<400> 69

aaagtatatg ctgaagctac tcaaaaagta taatgcgcct ccactacttt cgctaaattt 60
 ttatcgattt ccttattatt tatttctttc tatttattgt gatgaataaa ataattcat 119

<210> 70

<211> 117

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:
 oligonucleotide primers

<400> 70

atgggaattc aaatgaagaa caacatcctg gtgatcctga tcattctctct gtccatcaac 60
 cagatcaagt ctgctaactg tcctgtggga accgagacca acaccgctgg acagggtg 117

<210> 71

<211> 104

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:
 oligonucleotide primers

<400> 71

ctccaggcac gaaagcagca gcgttggtgt agtagaagtt cttctgacag ttcacacagt 60
 tagcaggggt tcccaggctg tccacctgtc cagcgggtgt ggtc 104

<210> 72

<211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:
 oligonucleotide primers

<400> 72

cgctgctgct ttcgtgcctg gagcttctac ctgtaccctc tgtcctcaga agaaggacgc 60
 tggagctcag cctaaccctc ctgctaccgc taacctggtg 100

<210> 73
 <211> 95
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:
 oligonucleotide primers

<400> 73
 gatgatagca gcgtagtcgg tagctcctcc agcgatagcg gttccagcag gacacttcac 60
 gttacactgg gtcaccaggt tagcggtagc aggag 95

<210> 74
 <211> 138
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:
 oligonucleotide primers

<400> 74
 gctaccgact acgctgctat catcaccgag tgtgtgaact gtcgcatcaa cttctacaac 60
 gagaacgctc ctaacttcaa cgctggagct tctacctgta ccgcttgtcc tgtgaaccgc 120
 gtgggaggag ctctgacc 138

<210> 75
 <211> 123
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:
 oligonucleotide primers

<400> 75
 ggtgaaagag cgcacgtagt cggtgggtcac tccgtcgtcc agagcgggtc cggtaggaca 60
 agccacgtta cactgagcca cgatggtagc agcggtttcca gcggtcagag ctctctccac 120
 gcg 123

<210> 76
 <211> 99
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:
oligonucleotide primers

<400> 76

gactacgtgc gctctttcac cgagtgtgtg aagtgtcgcc tgaacttcta ctacaacgga 60
aacaacggaa acacccttt caaccctgga aagtctcag 99

<210> 77

<211> 95

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:
oligonucleotide primers

<400> 77

gtgatggtag cgtcgtttcc cagggtagcc tgagccacgt tagcaggctt gatagcagga 60
caaggggtac actgagactt tccaggggtg aaagg 95

<210> 78

<211> 94

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:
oligonucleotide primers

<400> 78

gggaaacgac gctaccatca ccgctcagtg taacgtggct tgtcctgacg gaaccatctc 60
tgctgctgga gtgaacaact gggtggtcga gaac 94

<210> 79

<211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:
oligonucleotide primers

<400> 79

cagacaggta gagtttccag ggttgaagtt aggagcgttg ttgttgtaga agttaggagc 60
acagttggta cactcgggtg tctgagccac ccagttgttc 100

<210> 80
<211> 89
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
oligonucleotide primers

<400> 80
ccctggaaac tctacctgtc tgccttgtcc tgctaacaag gactacggag ctgagggtac 60
cgctggagga gctgctaccc tggctaagc 89

<210> 81
<211> 90
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
oligonucleotide primers

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gatgttacac tgcttagcca gggtagcagc 90

<210> 82
<211> 95
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
oligonucleotide primers

<400> 82
caactacgtg atcctgcaga ccgagtgtct gaactgtgct gctaacttct acttcgacgg 60
aaacaacttc caggctggat cttctcgctg taagg 95

<210> 83
<211> 92
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
oligonucleotide primers

<400> 83
gagcgatcag ggtagcgggt cctccagcgg tagccacagc tccctgcacc ttgttagcag 60
gacaagcctt acagcgagaa gatccagcct gg 92

<210> 84
<211> 94
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
oligonucleotide primers

<400> 84
gaaccgctac cctgatcgct cagtgtgctc tggagtgtcc tgctggaacc gtgctgaccg 60
acggaaccac ctctacctac aagcaggctg cttc 94

<210> 85
<211> 92
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
oligonucleotide primers

<400> 85
ggtgtcgatt ccagccaccc agtcgggtctg cttgggtggtg tagaagttag cagcacactt 60
cacacactca gaagcagcct gctttaggt ag 92

<210> 86
<211> 92
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
oligonucleotide primers

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gggtggctgg aatcgacacc tgtacctctt gtaacaagaa gctgacctct ggagctgagg 60
ctaactgcc tgagtctgct aagaagaaca tc 92

<210> 87
<211> 95
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:
oligonucleotide primers

<400> 87

gagggatcct tattacagca ggtagtaaga gatcagcagc agagagatag acaggaagtt 60
agcgaagtca cactggatgt tcttcttagc agact 95

<210> 88

<211> 52

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: repeating
primary structure motif

<400> 88

Cys Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
1 5 10 15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa Xaa Cys Pro Xaa Xaa
20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Cys Xaa Xaa Cys
50

<210> 89

<211> 58

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: repeating
primary structure motif

<400> 89

Cys Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
1 5 10 15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gln Cys Xaa Xaa Xaa Cys Pro Xaa
20 25 30

Gly Thr Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa

35

40

45

Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa Cys
50 55

<210> 90

<211> 16

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 90

Met Lys Tyr Asn Ile Leu Leu Ile Leu Ile Ile Ser Leu Phe Ile Asn
1 5 10 15

<210> 91

<211> 16

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 91

Met Lys Asn Asn Ile Leu Val Ile Leu Ile Ile Ser Leu Phe Ile Asn
1 5 10 15

<210> 92

<211> 12

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 92

Cys Pro Thr Gly Thr Ala Leu Asp Asp Gly Val Thr
1 5 10

<210> 93

<211> 13

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 93

Cys Val Lys Cys Lys Pro Asn Phe Tyr Tyr Asn Gly Gly
1 5 10

<210> 94

<211> 12

<212> PRT
<213> Ichthyophthirius multifiliis

<400> 94
Cys Val Lys Cys Arg Leu Asn Phe Tyr Tyr Asn Gly
1 5 10

<210> 95
<211> 11
<212> PRT
<213> Ichthyophthirius multifiliis

<400> 95
Cys Pro Ala Gly Thr Val Leu Asp Asp Gly Thr
1 5 10

<210> 96
<211> 11
<212> PRT
<213> Ichthyophthirius multifiliis

<400> 96
Cys Pro Ala Gly Thr Val Leu Thr Asp Gly Thr
1 5 10

<210> 97
<211> 19
<212> PRT
<213> Ichthyophthirius multifiliis

<400> 97
Ala Gly Thr Asp Thr Cys Thr Glu Cys Thr Lys Lys Leu Thr Ser Gly
1 5 10 15

Ala Thr Ala

<210> 98
<211> 19
<212> PRT
<213> Ichthyophthirius multifiliis

<400> 98
Ala Gly Ile Asp Thr Cys Thr Ser Cys Asn Lys Lys Leu Thr Ser Gly

1

5

10

15

Ala Glu Ala

<210> 99

<211> 17

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 99

Phe	Ala	Lys	Phe	Leu	Ser	Ile	Ser	Leu	Leu	Phe	Ile	Ser	Phe	Tyr	Leu
1				5					10					15	

Leu

<210> 100

<211> 17

<212> PRT

<213> Ichthyophthirius multifiliis

<400> 100

Phe	Ala	Asn	Phe	Leu	Ser	Ile	Ser	Leu	Leu	Leu	Ile	Ser	Tyr	Tyr	Leu
1				5					10					15	

Leu

<210> 101

<211> 12

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: short linker
sequence

<400> 101

Gly	Ser	Gly	Gly	Gly	Gly	Ser	Gly	Gly	Gly	Gly	Ser
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<210> 102

<211> 1410

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic
55kD i-antigen coding region

<400> 102

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